TELLUS INSTITUTE
Resource and Environmental Strategies

Advancing Resource Management Contracting in Massachusetts: Reinventing Waste Contracts and Services

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EXECUTIVE SUMMARY

This report summarizes a project sponsored by the Massachusetts Department of Environmental Protection (DEP) Bureau of Waste Prevention to assess the potential of using Resource Management contracting at nine case study organizations: Acushnet Company, Fitchburg State College, General Dynamics Defense Systems (GDDS), Harvard University, Lemuel Shattuck Hospital, One Beacon Street, Stop & Shop, Texas Instruments, and Verizon. Further detail on each of these companies is provided in Section 1.2.

Resource Management (RM) is a strategic alternative to disposal contracting that directs and provides incentives for external contractors to emphasize cost-effective resource efficiency through prevention, recycling, and recovery while limiting hauling and disposal. For RM to become a standard practice it needs to be tested and proven.

The project is being executed in two phases. Phase 1 (embodied in this report) assesses RM contracting practices and potential in a wide range of Massachusetts organizations. Phase II of the project will provide direct contracting assistance to a number of companies to implement and test RM on the ground.

DEP's rationale for the project is to consider RM as an innovative non-regulatory, market-based method to reduce waste generation and increase recovery of useful materials. In the past five years the recycling rate in Massachusetts has increased only 1-2 percent each year, preventing the state from achieving its Year 2000 recycling goals. RM may help boost recycling rates and, more importantly, create a vehicle for business partnerships to engage in "upstream" source reduction opportunities that will be essential to reach the ambitious goal of 70 percent waste reduction by 2010 articulated in the State's new *Beyond 2000 Solid Waste Master Plan*. RM is expected to play a part in a multi-pronged strategy laid out in the *Master Plan* to promote more sustainable practices in communities to reduce the need for landfills, combustion facilities, or waste exports.

RM Overview

Most of Massachusetts' waste stream is addressed through solid waste contracts where waste disposal volumes or service levels drive the compensation for solid waste contractors. In such arrangements, the financial incentives of the waste generator and the solid waste contractor are at odds; while the waste generator has an incentive to decrease waste quantities, the contractor is better off handling continuously increasing quantities of waste. These conflicting objectives work to impede serious progress in waste reduction.

Resource Management (RM) is a strategic alternative to disposal contracting that emphasizes cost-effective resource efficiency through prevention, recycling, and recovery while limiting hauling and disposal. RM is premised on the idea that contractors will pursue resource efficiency when provided the correct financial incentives. RM contracts align waste generator and contractor incentives by placing a "cap" on disposal compensation and providing opportunities for both the contractor and the generator to profit from resource efficiency innovations. Thus, if a contractor identifies cost-effective recycling markets for disposed

materials, or techniques for preventing waste altogether, they receive a portion of the savings resulting from the innovation. This arrangement enhances recovery of readily recyclable materials such as corrugated cardboard and wood pallets, while also encouraging source reduction and market development for difficult to recover materials such as paint sludge and solvents. Ultimately, this compensation scheme harmonizes the incentives of both parties: waste generators and their contractors benefit from resource efficiency innovations. A useful manner to better understand RM is to compare it to how most organizations contract for waste and recycling services. Primary features of traditional and RM contracts are shown in Table ES-1.

Table ES-1: Distinguishing Features of Waste Contracts/Recycling vs. RM Contracts

Features	**Traditional Waste Contracts and Recycling Arrangements**	**RM Contracts**
Contractor Compensation and Incentive Structure	▪ Unit price based on waste weight and/or number of pick-ups ▪ Recycling often non-contractual "add-on" service provided by same or other contractors Contractor Incentive: Maximize waste service and volume; no integration with recycling	▪ Constrain/cap waste hauling/disposal service to "cost-recovery" basis (eliminates profitability) ▪ Performance bonuses based on (and financed from) documented resource efficiency savings Contractor incentive: Seek savings through recycling/diversion and other resource efficiency innovations
Waste Generator-Contractor Relationship	Minimal interface and collaboration between generator (and other stakeholders influencing waste) and contractor	Strategic alliance: waste generator and contractor work together to derive value from resource efficiency
Scope of Service	Container rental and maintenance, hauling, and disposal or processing. Contractor responsibilities begin at the dumpster and end at landfill or processing site.	Services addressed in traditional hauling and disposal contracts as a last resort, plus services that inform and influence waste generation (i.e., product/process design, material purchase, internal storage, education on material use and handling, data management, reporting).

The lack of interconnection between waste hauling/disposal contracts and recycling/diversion programs often translates to contractors competing over management of a customer's waste stream. This is exacerbated by the informal nature of many recycling programs, which are often provided as "free" services. Often, multiple contractors are responsible for their own limited portion of the total waste or recycling picture, impeding a systems approach, such as an RM program in which coordinated price signals for trash, recycling, and other services are mutually reinforcing in support of resource efficiency goals. The RM contractor has clear "incentives" and is compensated as a "gatekeeper" to assure these services are thus aligned even though some services may be sub-contracted out to other specialized contractors.

Incentives are commonly financed with savings on disposal fees, hauling costs, and increased recycling revenues. Other cost savings that can be used for incentives include reduced storage requirements resulting from more effective ordering, volume price discounts, and more

economical material use. As the RM moves further "upstream" the value of these savings and the profitability for both the RM contractor and customer under a gain-sharing arrangement can be quite large. The underlying objective is to divorce the contractor's profit incentive from providing increasing trash service.

Summary of RM Nationally

In 1997, the General Motors Corporation (GM) launched a RM contracting initiative in response to both corporate waste reduction goals and limited and uncoordinated resource efficiency efforts among GM's 72 North American facilities. As a longstanding recycler that recovers and reuses virtually all scrap metals, GM's premise in launching its RM initiative was deceptively simple: there are no waste streams, only wasted resources. To achieve cost-effective conservation of plant resources, GM restructured its disposal contracts such that disposal costs were capped and financial incentives were provided for resource efficiency innovations. To date GM has executed RM contracts at two-thirds of its North American facilities, with all remaining facilities scheduled to come on line by the end of 2001. Plants that have had RM contracting in place for a year or more have realized a 20% reduction in overall waste generation (30,000 tons), a 65% increase in recycling (from 50,000 tons to over 82,000 tons), a 60% decrease in disposal, and a 30% decrease in waste management costs.

Building on GM's success with RM, Tellus Institute launched a national initiative to assess and advance RM practice in a range of institutional, commercial, municipal, and industrial settings. Sponsors for these ongoing projects include: the Nebraska Environmental Trust, the Florida Department of Environmental Protection, the Iowa Waste Management Assistance Divisions, the Missouri Department of Natural Resources, the Massachusetts Department of Environmental Protection, and US EPA's WasteWise program (Office of Solid Waste). A cumulative result of these projects is a set of standard RM practices any organization interested in RM should follow. The three activities are: (a) establish a baseline of waste management/recycling levels and review current contract structures; (b) provide an exclusive scope to a single RM contractor; and (c) create incentives that reward the RM contractor for resource efficiency. These activities and the corresponding five practices are described below in Table ES-2.

Table ES-2: Summary of Standard RM Practices

ACTIVITY	RM PRACTICE	DESCRIPTION
Contract Preparation	1. Establish Baseline Cost, Performance, and Service Levels	▪ Define current service scope and levels (hauling and tonnage) ▪ Identify existing contract compensation methods ▪ Validate service levels with total costs through annual baseline review/update ▪ Establish cost and performance benchmarks and goals
Transform Scope and Contractor/ Customer Relationship	2. Align all services to support resource efficiency	▪ Provide all responsibility to one contractor to coordinate, integrate, and formalize all waste and recycling contracts and services to ensure that all are mutually supportive of organizational resource efficiency goals
	3. Rethink Contractor Role and Relationship	▪ Allow or require bidders to submit operations plans for achieving specified improvements in existing operations, provide latitude in work specification ▪ Engage RM contractor in daily RM operations and responsibilities ▪ Allow or require contractor to interface with internal stakeholders (engineers, legal staff, purchasing, other contractors) to devise cost-effective solutions, assure buy-in, and foster organizational learning ▪ Establish quarterly meetings to report on performance and resolve issues
New Basis for Compensation	4. Establish Transparent Pricing for Services	▪ Delineate pricing information to specific services such as container maintenance, container rental, hauling, disposal, etc. This allows variable price savings, such as "avoided hauling and disposal" to flow back to generator and/or be used as a means for financing performance bonuses.
	5. Provide Direct Financial Incentives for Resource Efficiency	▪ Establish compensation that allows contractor to realize financial benefits for service improvements and resource efficiency innovations that result in cost savings ▪ De-couple or "cap" contractor profitability from trash disposal and service levels

Massachusetts Project – Phase I

Phase I of this project sought to assess the potential of a strategic alternative to disposal contracting called Resource Management (RM). The project is centered on specific findings from nine case studies conducted at leading Massachusetts' organizations. Information from these case studies served as direct input to meet the three primary objectives of this report:

1. Baseline existing waste disposal, recycling levels, and associated costs within each organization, and characterize opportunities for increased diversion and cost savings that may be possible by adopting RM contracting.
2. Benchmark existing contracting practices to provide a glimpse into the "state of waste and recycling contracting" in Massachusetts businesses. This involved assessing the degree to which participating organizations had already instituted elements of RM.

3. Evaluate how RM practices can be applied to performance-based contracts in which RM contractors are compensated on the basis of cost savings from resource efficiency improvements.

Baseline Waste and Recycling Contracts

Tellus met with all partner organizations to baseline existing waste disposal, recycling levels, and characterize trash and diversion programs in each partner organization. Attached to this report are the "technical briefs" specific to each organization. Each details the scope of services received; summarizes formal contracts and informal service arrangements for waste and recycling; and reviews materials recycled, service levels, and tonnages for calendar year 2000. The briefs also discuss the availability of information needed to quantify current diversion, set future diversion goals, and establish equitable compensation in RM contracts.

The nine case study organizations have a wide range of diversion rates: four have diversion rates above 60% (One Beacon, Stop and Shop, Texas Instruments and Verizon); three have rates ranging from 18%-28% (Fitchburg, General Dynamics, and Harvard); and two have diversion rates less than 5% (Acushnet and Shattuck Hospital). Thus, the case studies offered an excellent opportunity to evaluate the potential of RM for Massachusetts organizations that fall anywhere along this spectrum. Looking at all nine case studies together, some general findings emerged:

- The structure of solid waste and recycling contracts vary within different organization. Some organizations had formal contracts and others had "handshake" agreements.
- Data reporting is generally lacking. Billing information often served as the sole source of information on service levels and tonnage.
- Contracting is largely fragmented (e.g., waste and recycling contracts are executed separately with organizations typically more focused on waste).
- Recycling is typically viewed as an add-on to waste services or as a cost neutral proposition. Thus, it is typically viewed as something an organization should pursue to "do the right thing".
- All specific and contracted services started at the point they picked up waste or recyclables at the dumpster. Most source separation activities are done internally.

Potential for Cost Savings, Enhanced Recycling and Improved Services Using RM

All organizations could benefit from more systematic RM contracting. As shown in the following table, significant cost savings exist for all the case study organizations, including those with high base diversion rates. For these nine partner organizations alone, there exists the potential to divert an estimated 5,000 tons from regional landfills and incinerators, at a net cost savings of roughly $500,000. These funds can be used to create incentives for RM contractors to initiate recycling and other more resource efficient business practices.

Net savings range in value from $4,062 for Verizon to nearly $272,000 for Harvard University. The majority of these cost savings (90% plus in many cases) stem from the avoided hauling/ disposal component. It is these savings that are used as incentives for the RM service provider.

Table ES-3: Summary of Diversion/Cost Saving Opportunities for Participating Organizations, 2000*

	Shattuck Hospital	General Dynamics	Harvard University	Texas Instruments	Acushnet Company	Verizon	Stop & Shop	Fitchburg State
Base Diversion Rate	<1%	27%	28%	60%	5%	59%	72%	18%
Est. Additional Tons Recyclable/Recoverable	435	62	3143	355	593	53	200	143
Resulting Diversion Percentage	45%	43%	53%	75%	25%	74%	83%	31%
Percent Increase in Diversion Tonnage	5438%	63%	84%	24%	366%	25%	16%	69%
Percent Decrease in Disposal Tonnage	44%	22%	33%	37%	20%	37%	40%	31%
Savings -- "Gain-Sharing" Potential	$31,195	$27,280	$271,973	$30,605	$65,011(4)	$4,062	$10,551	$18,500
Savings as a Percent of Affected Base Service Cost	39%	48%	29%	18%	25%	42%	13%	31%

* One Beacon Street does not follow the standard format and could not be summarized in above table.

A logical question to ask is: "Why aren't companies taking advantage of these savings on their own?" A primary reason is because these savings are relatively small (typically less than 1%) compared to total operating costs and organizations typically focus on reducing larger cost centers. This is particularly true in today's "downsized" environment where individuals are already overworked and human resources are at a premium. However, as our assessment shows, while diversion savings may be relatively insignificant for a waste generator, they represent large potential increases in contract value for an RM contractor (13%-48%).

Conclusion

The results of this project suggest that RM has potential in a wide variety of commercial, industrial, and institutional settings. While an emerging model, RM continues to make in-roads as an alternative to traditional waste and recycling contracting practices. RM holds the promise of redefining the nature of services provided by the waste industry and the way waste-related companies generate profit.

Some of the broad conclusions based on the first phase of this project include:

- Most organizations do not have contracts that allow them to realize the full financial benefits of diversion. Many have focused on logistics and have achieved cost reductions by switching from regularly scheduled pick-ups to an "on-call" basis. However, few have completely unbundled fee structures that allow them to realize the total savings from diversion.

- External contractors have no ability or incentive to affect internal operations that would tap into the uncaptured value of recyclable commodities and avoided disposal fees.
- Performance-based methods (emphasizing quantifiable, measurable performance targets and quality standards) are absent from all waste/recycling contracts.
- The uncaptured value of recyclable commodities in the state's waste stream combined with avoided disposal fees can provide incintives for RM contractors and be a boon to both customers and vendors.
- RM fosters a "system view" of resources- allowing business to make greater resource efficiency changes and associations. Traditional solid waste practices pick up trash and recyclables at the curb or loading dock and generally do not involve looking "upstream" to make these connections.
- RM has the ability to help meet state waste reduction goals.

The most successful programs have devoted focused, ***internal*** resources to managing contracts/contractors and initiating recycling programs. One partner organization, One Beacon, has some of the RM practices in place. This program, managed by their property management firm, has successfully established transparent pricing to recoup savings from diversion. These savings are then used to initiate internal recycling programs. Similarly, Stop and Shop has devoted two full time employees to their waste and recycling activities. In today's competitive climate, however, many organizations simply cannot devote internal resources to non-core activities such as waste and recycling. The key element of RM is to provide incentives to an *external* RM contractor to drive internal recycling and source reduction programs. The contractor is paid for supplying these additional services through cost savings from improvements to the current system. Thus even if the overall cost savings are small or cost-neutral, customers will obtain a much higher level of service for the same amount of money. These services allow organizations to divert a higher percentage of their waste stream, to receive better data to manage waste and recycling activities, and to establish a system that seeks continuous improvement.

Unresolved Questions

Clearly, there is still much work to be done for RM to become a standard practice. An overall conclusion that can be taken from this initial research is that widespread diffusion of RM holds great promise for harnessing the power of the market to achieve resource efficiency goals. Despite this potential, we have also learned through this project and other ongoing research throughout the US, that at least three major factors are limiting RM adoption:

- *Lack of knowledge, visibility, and understanding*. Although the performance contracting components of RM are well established in other applications, the concept is relatively new to the solid waste field.

- *Hauling and disposal is cheap compared to other organizational costs*. Hauling and disposal contracts typically represent less than one-half of a percent of waste-generating organizations' operating costs. Thus, organizations logically focus their efforts and

resources on reducing larger operating costs and developing competencies in areas fundamental to their core business activity.

- *Lack of profit incentives for service providers to provide RM services.* While service providers could provide profitable and cost-effective resource efficiency service, conventional contracts do not provide the compensation or incentives to diverge from an established business approach that neither their clients nor any other third party organization are pushing them to change.

In addition there are lingering questions about RM. What are the limits to the model and where does it work best? How well does RM contracting work in small businesses? What are the constraints in achieving some of the strategic, upstream potential of RM (source reduction, environmentally preferable purchasing, design)? What are some of the organizational barriers customers must be aware of? These questions will best be answered empirically.

This project has done much to baseline current contracting practices, evaluate RM's financial and waste reduction potential, and provide standard contracting practices to assist organizations in moving toward RM. However, in order for RM to take hold, resources must be provided to both potential customers and suppliers of RM services to create a sustainable, long-term market for RM services. This can be accomplished most effectively by accelerating the adoption of RM services by organizations statewide. Once the model is established and success of the model proven in real world applications, additional education and outreach can quickly spur demand. On the "supply" side, once some initial momentum is obtained, the model will also be replicated through RM service providers actively promoting such services[1]. Thus, proving RM "in the field" will go far in reducing barriers and answering the above questions.

Next Steps: Massachusetts Project Phase II

This study was designed as the first stage in a two-phased project. The proposed second phase would go beyond "proof of concept" and seek demonstrable change in growing RM demand and service markets by providing direct contract assistance to organizations that rely on disposal and/or recycling contracts, building RM supplier capacity, and developing tools and guidance materials. This will be accomplished by executing RM contracts within Massachusetts organizations that rely on traditional waste and disposal contracts.

[1] Tellus has seen this occur in a similar performance based model in the chemical industry called Chemical Management Services (see www.checmialstrategies.org). More broadly, it is consistent with the diffusion of innovative business models in general.

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1. PROJECT BACKGROUND

This report summarizes a project sponsored by the Massachusetts Department of Environmental Protection (DEP) Bureau of Waste Prevention to assess the potential of using Resource Management contracting at nine case study organizations: Acushnet Company, Fitchburg State College, General Dynamics Defense Systems (GDDS), Harvard University, Lemuel Shattuck Hospital, One Beacon Street, Stop & Shop, Texas Instruments, and Verizon. Further detail on each of these companies is provided in Section 1.3.

Resource Management (RM) is a strategic alternative to disposal contracting that directs and provides incentives for external contractors to emphasize cost-effective resource efficiency through prevention, recycling, and recovery while limiting hauling and disposal. For RM to become a standard practice it needs to be tested and proven. This project is being executed in two phases. Phase 1 (embodied in this report) assesses RM contracting practices and potential in a wide range of Massachusetts organizations. Phase II of the project will provide direct contracting assistance to a number of companies to implement and test RM on the ground. This will be accomplished by spurring RM service through direct contract assistance to select organizations and by building RM supplier capacity. Lessons learned from both stages of this project will be used to develop tools and guidance materials to spur broader adoption of RM throughout the state. This is expected to enrich a growing library of "on the ground" case studies, and, in doing so, provide the details many organizations are seeking on implementation, barriers, and solutions to create sustained and mutually favorable RM contracts.

1.1 Project Drivers

DEP's rationale for the project is to consider RM as an innovative non-regulatory, market-based method to reduce waste generation and increase recovery of useful materials. In the past five years the recycling rate in Massachusetts has increased only 1 percent to 2 percent each year, preventing the state from achieving its Year 2000 recycling goals. RM may help boost recycling rates and, more importantly create a vehicle for business partnerships to engage in "upstream" source reduction opportunities that will be essential to reach the goal of 70 percent waste reduction by 2010 articulated in the State's new *Beyond 2000 Solid Waste Master Plan (Master Plan)*. RM is expected to play a part in a multi-pronged strategy laid out in the *Master Plan* to promote more sustainable practices in communities to reduce the need for landfills, combustion facilities, or waste exports.

The past several years have also seen increased emphasis on state waste ban regulation enforcement as a means to advance recycling and preserve disposal capacity. DEP has proposed banning the disposal of unprocessed construction and demolition (C&D) debris in 2003 and expanding waste ban regulations to include additional recyclable materials and promulgating stricter standards for loads containing unacceptable amounts of banned materials. In addition to more oversight and enforcement, DEP will examine non-regulatory means to promote compliance. RM represents a voluntary, business-driven strategy, hopefully lessening some state resource obligations for enforcement activities and complementing those activities. RM also coincides with DEP's vision for the future of the waste industry that the industry "must fully embrace waste reduction as part of its core business." Finally, RM dovetails with other DEP

initiatives outlined in the *Master Plan* to expand markets for recyclables and provide recycling education and technical assistance to businesses.

Facing the prospect of increased regulations and disposal price increases, organizations were motivated to participate in the project to evaluate the role their contractors (or other suppliers) could have in managing and reducing generation and discard of materials. Participating organizations were also interested in benchmarking their contracting practices against other organizations and improving their waste management services. Finally, organizations perceived RM as a potential means to control costs and achieve continuous improvement in pursuit of implicit or explicit reduction and recycling goals.

1.2 Project Objectives and Approach

This report synthesizes specific project findings from nine case studies conducted at leading Massachusetts organizations. Information from these case studies served as direct input to meet the three primary objectives of this report:

1. Benchmark existing contracting practices to provide a glimpse into the "state of waste and recycling contracting" in Massachusetts businesses. This involved assessing the degree to which participating organizations had already instituted elements of RM.
2. Baseline existing waste disposal, recycling levels, and associated costs within each organization, and, in conjunction with waste stream composition data, characterize opportunities for increased diversion and cost savings that may be possible by adopting RM contracting.
3. Evaluate how RM practices can be applied to performance-based contracts for increased transparency, collaboration, and aligned incentives in which RM contractors are compensated on the basis of cost savings from resource efficiency improvements.

To perform this assessment, Tellus quantified current waste and recycling service levels, volumes, and costs for each organization. The potential to increase current diversion through additional recycling or composting was identified through scenario assessments that represented improvements from the current baseline. The net financial impacts of the scenarios were compared to current costs to determine the potential contract savings that would be available to each organization. These savings are characterized as the "gain-sharing" potential that may be used for incentives to RM contractors who successfully improve recycling and reduce disposal. Finally, Tellus applied its knowledge of performance contracting to assess current practices and provide advice on how to modify contracts to realize the resource efficiency potential of RM.

1.3 Participating Organizations

DEP and WasteCap[2] recruited a diverse cross-section of organizations located in various areas of the state to participate in this study (Table 1). Organizations represent various industrial, institutional, and commercial sectors.

[2] WasteCap of Massachusetts is a statewide, 501(c) 3 non-profit, public/private partnership working with the state's business community to promote and implement voluntary recycling, buy recycled, reuse, and source reduction programs.

Table 1: Partner Organization Profiles

Acushnet Company: Acushnet Company designs and manufactures golf equipment. Within the greater New Bedford, Massachusetts area, Acushnet's golf equipment manufacturing group consists of nine facilities employing approximately 2,000 people in all stages of golf equipment manufacturing, from engineering and manufacturing to packaging and distribution.

Fitchburg State College: Fitchburg State, a four-year public college in Central Massachusetts, offers a wide variety of professional and liberal arts programs at the graduate and undergraduate levels. Fitchburg State's campus consists of approximately 30 buildings on 35 acres of grounds. The College enrollment is approximately 2,500 students in its day division and another 3,000 students in its evening and graduate programs, with 515 faculty and staff and an endowment of $7 million.

General Dynamics Defense Systems (GDDS): General Dynamics (GD) is a manufacturing contractor with leading market positions in business aviation, information systems, shipbuilding and marine systems, and land and amphibious combat systems. As an operating sub-unit of GD located in Pittsfield, Massachusetts, General Dynamics Defense Systems (GDDS) employs approximately 1,000 persons. GDDS provides software development and electronics systems design and integration for aircraft and military (primarily naval) applications. It also provides telecommunications solutions and data management services for the commercial market.

Harvard University: Harvard University is the oldest institution of higher learning in the United States (founded 1636), with an endowment of $19.2 billion (FY 2000) and a student population of 18,598 full-time equivalent (FTE) students enrolled in the undergraduate college and 10 graduate and professional schools. Harvard employs 15,101 FTE faculty and staff. The majority of the Harvard campus and physical plant is situated in Cambridge, Massachusetts, with the Business and Medical School located in Allston and Boston.

Lemuel Shattuck Hospital: The Lemuel Shattuck Hospital, located in Jamaica Plain, Massachusetts, is the primary provider of outpatient and inpatient services for the Massachusetts Department of Public Health in the Metro-Boston area. The hospital has 278 inpatient beds, and an additional 100 beds in its detoxification and AIDS treatment programs. There is also a secure 20-bed inpatient correctional unit.

One Beacon Street / CB Richard Ellis: One Beacon Street is a high-rise office building in Boston with over 1.1 million square feet and a permanent population of 3,500. The building is managed by CB Richard Ellis (CBRE), a national full-service leasing and property management company whose services run the gamut from asset management, to research, consulting, and advisory roles. In its capacity as property manager at One Beacon, CBRE is responsible for executing all waste management and recycling operations for the property.

Stop & Shop: Stop & Shop is a multibillion-dollar corporation and the largest food retailer in New England with more than 315 stores. The chain has stores located in five Northeastern states including Connecticut, Massachusetts, New Jersey, New York, and Rhode Island. This case study focuses on Stop & Shop Store 10, a large retail location in Dorchester, Massachusetts.

Texas Instruments: Texas Instruments Incorporated (TI) is a leading producer of digital signal processing and analog technologies for wireless and broadband applications, and for new and emerging markets such as digital cameras and digital audio. The case study focuses on Sensors and Controls, located on a 275-acre site in Attleboro, Massachusetts. The 14-building campus has approximately 2,000 employees and occupies over 1 million square feet of office and manufacturing space.

Verizon: Verizon Communications, formed by the merger of Bell Atlantic and GTE, is one of the world's leading providers of high-growth communications services. Verizon companies are the largest providers of wireline and wireless communications in the United States, serving the equivalent of nearly 125 million access lines and 28 million wireless customers. Verizon's Information Services Division is a world-leading print and online directory publisher and content provider. The case study focuses on the Information Services office building in Middleton, Massachusetts. This 266,000 square-foot facility houses approximately 700 Information Services division employees, and serves as its New England headquarters.

Chapters 3-5 of this report discuss the current state of contracting for waste and recycling services and assess the potential for participating organizations to achieve cost-effective diversion through RM. The section below provides a conceptual overview of RM.

2. WHAT IS RESOURCE MANAGEMENT CONTRACTING?

Resource Management (RM) is a strategic alternative to disposal contracting that seeks continual improvement in resource efficiency through prevention, recovery, and recycling of waste materials. When incentives are tied to the value of services that foster prevention, reuse, and recycling—with disposal as the last resort—contractors' activities align with the customers' in a new type of joint effort. However, this is currently the exception rather than the rule in integrated solid waste management contracting in Massachusetts.

2.1 Origins of RM

RM is based on the idea that contractors will pursue resource efficiency when offered proper financial incentives. RM contracts are designed to align waste generator and contractor incentives by limiting costs for disposal and providing opportunities for both the contractor and the generator to profit from cost-effective resource efficiency innovations. In other words, if contractors identify cost-effective recycling markets for disposed materials, or techniques for preventing waste altogether, they receive a portion of the savings resulting from the innovation. This arrangement enhances recovery of readily recyclable materials such as corrugated cardboard and wood pallets while promoting opportunities to develop new markets for difficult-to-recover materials such as paint sludge and solvents. As a result, it promotes a business-driven effort to make waste reduction and pollution prevention a priority. While RM may improve reputation, employee morale, safety (in hazardous waste reduction), and other "intangibles" that contribute to competitive advantage, decision-makers understand issues better in financial terms. The most appealing facet of RM to decision-makers, therefore, may be its cost saving or cost-neutral premise, which seeks higher resource efficiency and additional services for each dollar currently spent on waste and recycling.

RM stems from the broader area of performance-based contracting. Performance-based contracting emphasizes quantifiable, measurable performance requirements and incentives, and is designed to ensure that payment is made only for services that meet these levels.[3] One of the better-known users of such contracts are the energy service companies (ESCOs) which first gained prominence in the 1970s. ESCOs generally identify and supply necessary capital for energy efficiency improvements and receive a return on investment from cost savings derived from reduced energy consumption.

General Motors Corporation (GM) adopted the term "resource management" as a logical outgrowth of its success with a similar performance-based contracting system in the area of chemical purchasing, use, and management.[4] GM embraced RM in response to an internal

[3] Office of Federal Procurement Policy (OFPP), 1998, *A Guide to Best Practices for Performance-Based Service Contracting*. http://www.arnet.gov/Library/OFPP/BestPractices/PPBSC/BestPPBSC.html

[4] GM has been practicing chemical management for more than 15 years. For more information on chemical management services, see http://www.chemicalstrategies.org.

corporate waste reduction goal and the recognition that existing hauling and disposal contracts produced limited and uncoordinated resource efficiency across its more than 70 North American facilities. GM's objective in executing RM contracts was to "provide a systems approach to resource efficiency that motivates cost reduction and conservation of plant resources." [5] One year after implementing RM contracts at several of its North American plants, GM realized a 20 percent reduction in overall waste generation (30,000 tons), a 65 percent increase in recycling (from 50,000 tons to over 82,000 tons), and a 15 to 30 percent decrease in waste management costs.[6]

Performance based contracting in the solid waste area is certainly not entirely new – several progressive organizations, including those profiled in this project, have implemented elements of RM. However, RM is an emergent discipline that will require further definition and standardization to prevent confusion with existing terminology and to better define what, operationally speaking, constitutes RM contracting. As this study and other ongoing research shows, full realization of the potential benefits requires a systematic approach, up-front in the contracting process (these are embodied in the "RM practices" in section 4.1). By changing the ways in which organizations demand and pay for integrated waste management services, RM has the potential to transform the waste disposal industry into a sector that profits from mutually beneficial resource efficiency gains, rather than ever increasing quantities of waste.

2.2 Resource Management versus Traditional Waste and Recycling Arrangements

A logical starting point to understand RM is to compare and contrast elements of traditional waste contracts and recycling arrangements with RM contracts. Typical disposal contracts send exactly the wrong economic signal to waste management contractors: more waste equals more profit. For this reason, they impede serious progress in resource efficiency by providing a profit incentive for disposal. The basic features of RM contracts are fundamentally different from those of traditional hauling and disposal contracts in three key areas: the scope of services, the nature of the contractor-customer relationship, and compensation and incentives offered (Table 2).

[5] Underwood, Warren, 2000. General Motors Corporation Worldwide Facilities Group. Adopted from a presentation at the 2000 National Recycling Congress, Charlotte, NC, entitled: "Resource Management."

[6] The variance in cost reduction can be attributed to the fact that some facilities were further along in their source reduction and recycling programs, and therefore had less opportunity to make quick gains.

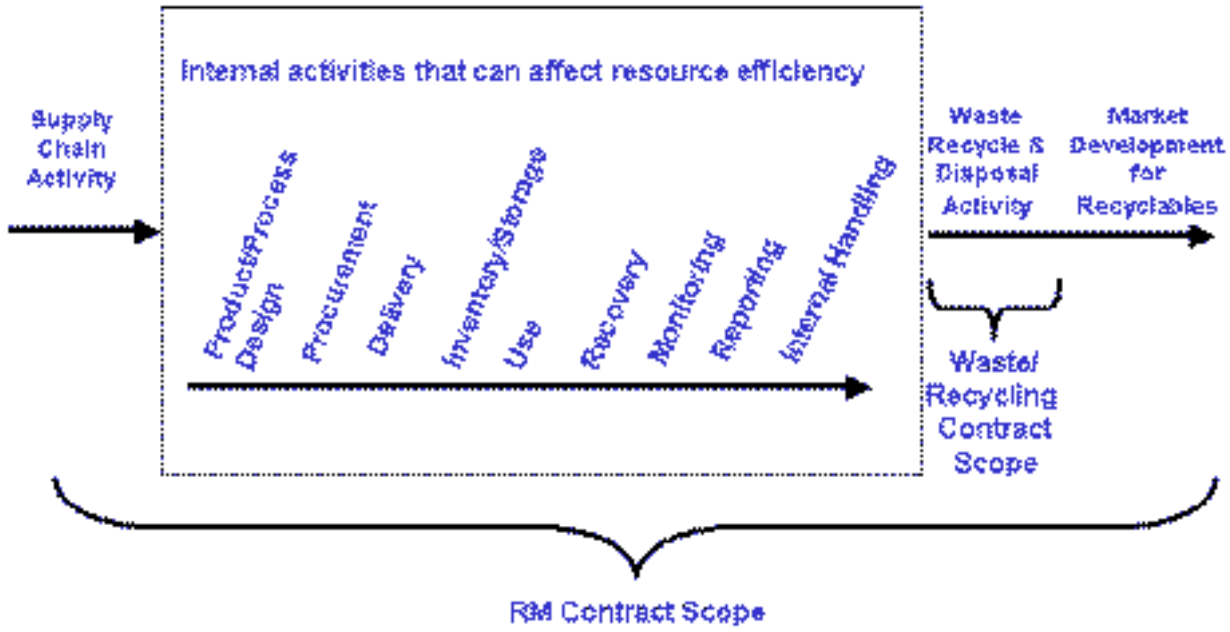
Table 2: Distinguishing Features of Traditional Contracts vs. RM Contracts

Features	Traditional Waste Contracts and Recycling Arrangements	RM Contracts
Scope of Service	▪ Waste services and recycling services are separate. Contractor services include container rental and maintenance, hauling, and disposal or processing. ▪ Contractor responsibilities begin at the dumpster and end at landfill or processing site.	▪ Single contractor for all waste and recycling services, plus services that inform and influence waste generation (see Figure 1).
Contractor Compensation and Incentive Structure	▪ Unit price based on waste weight and/or number of pick-ups ▪ Recycling often non-contractual "add-on" or "free" service provided by waste contractor or other provider Contractor Incentive: Maximize waste service and volume; no integration with recycling/ diversion/source reduction services	▪ Cap total waste and recycling service cost (to control total contract costs) ▪ Performance bonuses based on (and financed from) demonstrated resource efficiency savings from documented baseline Contractor incentive: Seek savings through recycling/diversion and other resource efficiency innovations
Customer-Contractor Relationship	Minimal interface and collaboration between waste generator (incl. all stakeholders influencing waste) and contractor	Strategic alliance: waste generator and contractor work together to derive value from resource efficiency

2.2.1 Scope of Services

Traditional waste management contracts specify services that begin at the dumpster and end at the ultimate point of disposal, normally a landfill or incinerator. Services provided are limited to container rental and maintenance, hauling, and ultimate disposal or processing. An RM contractor addresses both external waste management activities and internal activities that affect waste generation. Initially, the scope of an RM contract might focus on optimizing external hauling, monitoring and reporting, or recycling services (activities shown at far right of Figure 1). However, as trust is built over time, and as limits to cost effective recycling and diversion are reached, the RM contractor has both the profit incentive and mandate to work further "upstream" to optimize the resource efficiency of other supply chain activities. Thus, in more advanced forms, RM can lead to more efficient material use, storage, and ordering; reduced purchase costs; or ultimately more resource efficient product or process design. In general, as RM affects activities further upstream, the value of these savings (and hence the profitability for RM and customer) can be quite large when compared to diversion savings (avoided disposal and increased recycling revenues) alone.

Figure 1: RM vs. Hauling Contract Scope in a Typical Industrial Setting



2.2.2 Compensation and Incentives

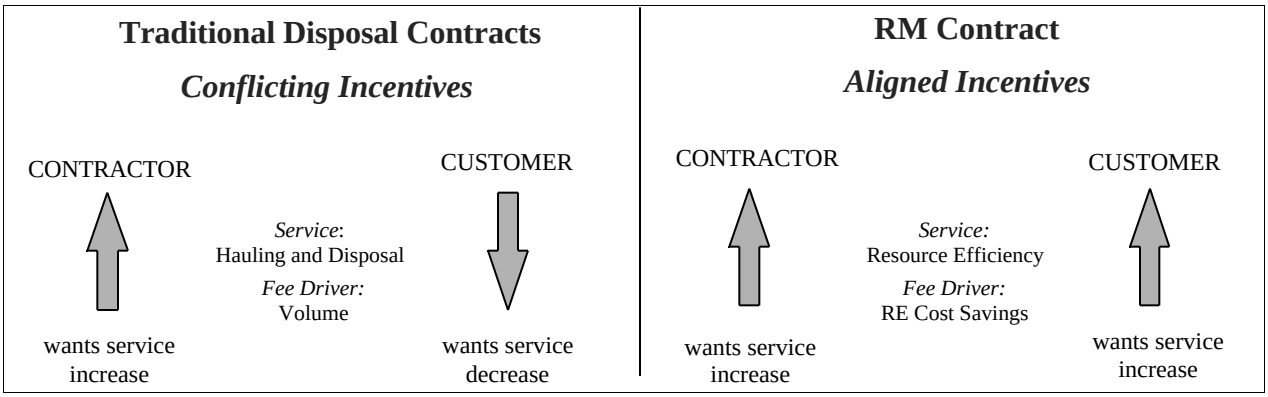
The compensation and incentive structure devised under RM is central to achieving the full potential benefits of the model. In traditional waste contracts, waste generators typically pay a unit price based on the weight of trash collected, number of pick-ups, and any container rental fees. Moreover, recycling is often a separate service to be paid for or a peripheral and non-contractual activity. Recycling is generally at odds with any waste contractor's main business drivers, since any ton of waste managed through recycling translates to an equivalent reduction in waste managed by the waste hauler. From the customer's perspective, recycling may be viewed as another cost, instead of as a means to save on disposal costs and improve resource efficiency.

The contractor's compensation structure under RM is fundamentally different than under traditional arrangements. Under RM, profitability is determined by the value of resource efficiency savings achieved through recycling and other activities, rather than quantities of waste disposed. This is accomplished by using contracts to change the terms of business, redirecting funds from supporting trash service to provide incentives for recycling and other more resource efficient management methods (i.e., reuse, reduction through process/procedure redesign) where and when it is cost effective to do so.

In practice, this is achieved by first placing a "cap" on total organization-wide waste and recycling costs. Note that this includes all waste and recycling activities and costs, including internal separation and collection activities and costs and external fees/revenues paid to external contractors. The "capped" baseline costs should be renegotiated and updated periodically to

account for changes in production and associated increases or decreases in total waste management cost. Any savings from cost-effective resource efficiency activities (measured from the capped baseline) is then used to provide incentives to the RM contractor. For initial recycling and diversion improvements achieved by the RM contractor, this value includes any revenues achieved by avoided disposal costs (i.e., decreased hauling and landfill tip fees or incineration fees) and increased revenues from recovered materials. As the program matures, cost savings used for incentives could include avoided purchasing costs or other savings from changes in processes. Under such compensation schemes, the contractor receives the right price signals and their incentives align with those of the customer (Figure 2).

Figure 2: Contractor and Customer Incentives in Traditional Disposal and RM Contracts



2.2.3 Contractor-Customer Relationship

The combination of increased scope of services and financial incentives necessitates a different relationship between customer and contractor. With conventional waste and recycling services, there is little communication between the customer and contractor after contract inception, other than for sporadic problem resolution or regular service requests. Collaboration on efforts to reduce/reuse/recycle is non-existent. Under RM, contractors are given more access, control, and responsibility over waste generation activities. In this new relationship, the RM contractor has both the financial motive and the capacity to interact with key internal players who are capable of influencing waste generation, such as custodial staff, purchasers, environmental and design engineers, and purchasers. Regularly scheduled quarterly performance updates run by the RM contractor should be planned to facilitate communication, feedback, and proposed projects for continuous improvement.

RM is applicable for nearly any organization that relies on an external contractor to handle waste and recyclables. In industrial settings, contractors can provide on-site staff with the technical expertise to assist in the management, diversion, and reduction of specific waste streams within a plant, or assist in outreach and training activities about recycling. Providers can also help their clients structure their supply and service arrangements to reduce waste generation or enhance the recoverability of the waste created.

Although internal activities vary from organization to organization, a similarly comprehensive RM scope applies in non-industrial settings as well. In commercial organizations and institutional settings, for example, RM contractors might work closely with internal janitorial and administrative staff to optimize resource efficiency. In municipal settings, a RM contractor might assume a more active role in public education and outreach to foster increased participation in recycling. Regardless of the organization type or source of resource efficiency, the generator and RM contractor share the savings.

The real strategic value of RM lies in its ability to leverage the core competency of contractors while allowing the waste generator to concentrate resources on activities where it can provide unique value to its own customers. In pursuing the performance bonuses made available to them, RM contractors provide services above and beyond those offered in traditional waste contracts. For example, enhanced data tracking and reporting is a key added service that helps drive improvements in any program. These types of services are often more innovative, analytical, and management-oriented than "dump and return" waste or diversion services. This permits full utilization of contractors' investments, innovations, and specialized capabilities that may be more expensive to duplicate internally.

3. CURRENT CONTRACTING STRUCTURES AND BASELINE SOLID WASTE AND RECYCLING SERVICE LEVELS

An underlying assumption of RM is that cost effective resource efficiency opportunities exist and will be pursued if the appropriate financial incentives are contractually in place. In this study waste and recycling quantities and current contracting procedures for the participating organizations were summarized. Major findings and trends regarding the trash and recycling services for which the nine case study organizations have contracted are detailed below.

Section 3.1, *Baseline Trash and Recycling Service Levels*, characterizes trash and diversion programs in each partner organization. It details the scope of services received, materials recycled, and service levels and tonnages for calendar year 2000. It also discusses the availability of information needed to quantify current diversion, set future diversion goals, and establish equitable compensation in RM contracts. Section 3.2, *Baseline Contracts and Compensation*, summarizes formal contracts and informal service arrangements for waste and recycling. Recommendations on how contracting procedures can be improved through RM are given in Section 4. Detailed case studies of each organization are provided in Appendix A.

3.1 Baseline Trash and Recycling Service Levels

Overall, there is wide variance in the scope and structure of participating organizations' trash and recycling contracts and agreements. This is due in part to differences in size and number of facilities, management attention to waste/recycling, service availability, business requirements, and contracting approach. This diversity is reflected in the tonnage of material each organization generated, and the recycling and diversion performance in (Table 3).

Table 3: Summary of MA Organizations' Waste/Recycling Levels, 2000

Partner Organization	Materials Diverted[t]	2000 Disposal (tons)	2000 Diversion (tons)	Estimated Diversion Rate
Acushnet	Mixed paper, OCC, steel	2890	162	5%
Fitchburg	Mixed paper	928*	207*	18%
General Dynamics	White ledger, mixed paper, OCC, steel	267	98	27%
Harvard University	Mixed paper, OCC, organics, metal and plastic containers, lab glass/plastic	9510	3745	28%
One Beacon Street	Mixed paper	460	750	62%
Shattuck Hospital	Mixed paper	987	8*	<1%
Stop & Shop	Leftover food, OCC	496	1266*	72%
Texas Instruments	Mixed paper, OCC, plastics, metals, wood	972	1478	60%
Verizon	Mixed Paper, OCC, Phonebooks and magazines	144*	210	59%

[t] Several organizations had other diversion programs that targeted small volumes of material. These included charitable donation of used office furniture, informal bottle and can programs, fluorescent tube recycling, electronics recycling, etc. These specialized or sporadic waste streams were not included in the analysis.

* Based partially or entirely on estimated disposal/recycling capacity due to a lack of empirical data.

3.1.1 Trash Service Levels

For trash services, most participating organizations receive pick-up/hauling, disposal, and some form of container/compactor rental. Detailed information for all organizations on trash service levels are summarized in Appendix B. For each organization, specific information was sought regarding contracted disposal services, including:

- Sites/facilities serviced
- Number and size/type of disposal containers at each facility
- Pick-up arrangement and schedule (fixed schedule, "on-call", or some combination)
- Tonnage of trash managed

In all participating organizations, a single contractor provided trash service. Multiple contracts were in place in three organizations (GDDS, Fitchburg, and Acushnet), while five (Harvard, Fitchburg State, Acushnet, General Dynamics, and Texas Instruments) had a single contract that covered multiple buildings. The number, size/type, and location of disposal containers and trash service levels (including tonnage and number of hauls) were well documented in the majority (78%) of cases. Billing information often served as the sole source of information on service levels and tonnage. The level of detail of this data was heavily dependent on the contract structure. Those participating organizations with "bundled"[7] fee structures (Verizon and Fitchburg) receive monthly invoices providing a contract number and a single charge for hauling, container rental, and disposal services. These "black box" invoices do not contain details on tonnage for hauls. Consequently, for these two cases, industry standard densities were used in combination with known pick-up schedules to derive estimated annual disposal tonnages.

[7] Specifies one lump sum monthly charge for all services received without delineating specific line item charges.

Other participating organizations had more transparent billing that included pick-up dates, locations, tonnages, and monthly container rental fees. Such detailed billing facilitated the environmental accounting performed in this project. It also allows an organization to understand exactly what services they are paying for and to identify problem areas (e.g., large volume of organic trash or corrugated being generated by a cafeteria) and areas for improvement.

Four of the nine case studies received regularly scheduled pick up service while the remainder were exclusively "on-call", or a combination of the two. On-call service (when a representative calls the contractor to service full containers) tends to minimize the number of pick-ups required, and is usually put in place to reduce hauling costs. Organizations also use on-call service when specific containers are less regularly used, such as those designated for bulky waste. In general, partners observed that on-call service requires them to pay more attention to waste containers.

Surveying trash services received by participating organizations under their current contracts produced the following observations that are of particular interest in the context of RM:

- By and large, all trash services were detailed in the solicitation documents, and involved hauling and disposal in all cases, and often container rental.
- Very few, if any, employed performance-based methods specifying the purpose of the work to be performed (emphasizing quantifiable, measurable performance requirements and quality standards).
- All contracted services started at the point they picked up the dumpster.
- Trash contractors have no incentive or ability to optimize or limit hauling or disposal services provided, and have little reason to provide additional value-added services (e.g., improved reporting, education/training on recycling[8]). In fact, their profit model depends on securing certain trash levels or a number of regularly scheduled pick-ups even if containers are not full.

While these observations may not be surprising, they provide evidence that organizations do not look to their contractors to assist with any types of diversion activities. Rather, contractors pick up whatever is left for them while participating organizations must perform recycling or other diversion activities internally.

3.1.2 Recycling Service Levels

Recycling services in participating organizations included collection/hauling and processing services for a variety of recyclable materials (see Table 3 and Appendix C for a summary of recycling services/levels for all organizations). Most containers used for collection and consolidation of recyclables were either owned by participating organizations, or provided free of charge by the recycling contractor. A smaller number were leased from the contractors. Four

[8] In One Beacon's case, the waste/recycling contractor provides additional metrics (e.g., monthly and cumulative recycle rate, number of trees, gallons of water and oil saved) and collaborates on internal recycling training and education as a result of a more performance-based contracting approach that provide incentives for recycling over disposal.

organizations focused exclusively on mixed paper and fiber recycling, while the remainder also included other materials in their diversion programs. The most common of these other materials were metals (ferrous and non-ferrous), plastics, and wood. Only two organizations had arrangements for organics diversion. Organics diversion therefore represents a potentially large, untapped opportunity in participating organizations. Industrial partners (General Dynamics, Texas Instruments, Acushnet) captured a broader variety of higher value materials. Several participating organizations also had employee led programs to recycle or divert miscellaneous materials (e.g., toner cartridges, beverage containers, old office furniture, fluorescent lamps).

Three organizations (One Beacon, Texas Instruments, and Fitchburg) were provided integrated services for trash and recycling services through one contractor. Stop & Shop has one provider for its trash and corrugated cardboard recycling, and two additional non-contractual programs to divert organics (via a farmer and a food bank). The remaining organizations have established a mixture of contracts and informal arrangements (see section 3.2) for recycling of various materials through multiple contractors.

In all cases, either a custodial contractor or designated internal department handles internal collection and consolidation of both trash and recyclables. These same individuals are usually designated with the responsibility of calling in service requirements where pick-up is "on-call". However, much like trash service, external recycling contractors interact with the organizations simply to pick up relevant materials once its been collected and consolidated. As a result, the burden of recovering materials rests solely on the organizations, with recycling contractors simply taking whatever is recovered. The contractor has neither the opportunity, nor the ability/motive to provide additional "internal" services such as training/education on recycling or material use, comprehensive reporting, or analysis of additional recycling and source reduction opportunities. These issues—as with the trash service—are a product of a limited scope of service, and the fact typical compensation structures are not aligned with organizational resource efficiency goals. In the case of recycling, scarcely enough compensation is provided for contractors to make a slim profit, let alone provide additional services to divert more recyclables from disposal.

The most significant determinant of recycling performance was the degree to which management attention and resources were dedicated to maximizing diversion, including managing contracts. Participating organizations that achieved the highest recycling rates had devoted *internal* resources to minimize cost and align services to increase diversion. A commonality in organizations with low recycling rates was a lack of integration and coordination between disposal service and *ad hoc* recycling arrangements. In these circumstances, with minimal oversight and management, trash service becomes the predominant mode of waste management, resulting in lower diversion rates.

Surveying recycling services received by participating organizations under their current contracts produced the following observations that are of particular interest in the context of RM:

- Trash and recycling/diversion activities are not integrated in any kind of systematic manner.

- The burden of recovering materials rests solely on the organizations, with recycling contractors simply taking whatever is recovered.
- The contractor has neither the opportunity, nor the ability/motive to provide additional "internal" services such as training/education on recycling or material use, comprehensive reporting, or analysis of additional recycling and source reduction opportunities.
- Participating organizations that achieved the highest recycling rates had devoted *internal* resources to minimize cost and align services to increase diversion.

3.2 Baseline Contracts and Compensation

Participating organizations have implemented a variety of arrangements to secure waste and recycling services that reflect the diversity of their requirements. One commonality between participating organizations was that all trash services were established under contract as a result of a competitive bid process. Recycling services were secured either as an additional service under the trash contract, or, more commonly, through one or more separate contracts, purchase orders,[9] or informal arrangements.

3.2.1 Trash Contracts

For their trash contracts, most organizations employ a simple bid procedure specifying locations and estimated service requirements for which prospective contractors submit monthly and annual bids. In most cases, these contracts for trash service are put out to bid using historical trash levels and the bidder who proposes the most economical approach to meet the given service level wins.

While contracts vary in duration and scope of required services from one partner to the next, most contracts are 3 years in length, with pricing structures that break out costs of specific components such as container rental and hauling (Table 4). In two cases—Fitchburg and Verizon—trash charges are totally "bundled", specifying one lump sum monthly charge for all services received without delineating specific line item charges. Under Fitchburg's contract, all services—including its paper recycling service—are bundled, and a fixed monthly charge for each of the two contracts[10] is paid. Verizon's bundled services include all disposal and container rental fees, four monthly pick-ups, and a "per pull" charge for hauling exceeding this base level (averaging two additional pick-ups per month). For Harvard University, container rental and haul fees are bundled together due to the fixed pick-up schedule, while disposal fees are tonnage-based. Acushnet has also established a bundled structure for trash service at one of its smaller waste generating facilities, with little tonnage variation from month to month. For the most part, however, organizations have in place contract structures that will allow them to save on disposal and haul costs with increased diversion.

[9] A purchase order is a document used to formalize a purchase transaction with a vendor for which there may have been only informal competitive selection (via "shopping around"). Normally a purchase order contains statements as to the quantity, description, and price of the goods or services ordered; agreed terms as to payment, discounts, date of performance, transportation terms, and all other agreements pertinent to the purchase and its execution by the vendor.

[10] One covers academic/recreational buildings, the other encompasses residential buildings.

Table 4: Summary of Trash Contract Structures and Net Cost, 2000

Partner Organization	Contract Length (Expiration date)	Contract Structure	2000 Cost	Average Cost per ton
Acushnet	▪ 1 year (renewable)	"Unbundled"(1)	$262,420	$91
Fitchburg	▪ 3 year (6/04)	"Bundled"	$59,070	$64(2)
General Dynamics	▪ 1 yr ext. ends (original 2 yr.) (9/03)	"Unbundled"	$60,883	$228
Harvard University	▪ 2-year extension (original 3 yr.) (6/02)	"Unbundled"(3)	$825,900	$128
One Beacon Street	▪ Month-to-month (cancelable with 30 day notice)	"Unbundled"	$56,000(4)	$47
Shattuck Hospital	▪ 8 years (6/06)	"Unbundled"	$76,565	$78
Stop & Shop	▪ 3 years (11/02)	"Unbundled"	$41,388	$84
Texas Instruments	▪ 5 year (7/03)	"Unbundled"	$167,000	$172
Verizon	▪ 3 year (11/01)	"Bundled"(5)	$9,600	$67(2)

(1) With exception of one small generator facility.

(2) Assumes all disposal capacity (estimated on known service levels and container volume) used. Average cost probably higher as all capacity not likely to be used.

(3) Container and haul fees bundled

(4) Includes trash and recycling charges

(5) With the exception of additional charge per haul above the specified service level of 4/month.

Table 4 demonstrates the high variability in average trash costs estimated for participating organizations, ranging from $64 to $228 per ton.[11] There are several possible factors explaining this variation:

- The two lowest estimated trash tonnages (Fitchburg and Verizon) were calculated assuming full use of disposal capacity at industry standard densities. Because this is rarely the case, the actual tonnage managed is likely to be less, and consequently, the cost per ton is likely to be somewhat higher. Nonetheless, Verizon ($67/ton) did believe its capacity was near full utilization.
- Local service markets and procurement/bidding practices may explain some of the differences. For example, some organizations limit the release of their bids to a "shortlist" of prospective contractors, possibly limiting the competitiveness of offerings.
- In two cases (Texas Instruments and Acushnet), there was a discrepancy between reported costs and service levels given the pricing structures. This indicates a failure to reconcile and verify service data with accounting data.
- In the case of General Dynamics, with multiple contracts for several waste streams, management is more onerous and cost optimization very difficult due to widely divergent costs per ton of material managed.

[11] Includes all trash related charges divided by either (1) invoiced tonnage, or (2) tonnage estimated from service capacity, depending on data availability.

Because trash service costs are relatively insignificant compared to total operating costs—typically a fraction of one percent—trash contracts are not a major priority for many organizations. Focus is placed on larger costs and resources devoted to areas fundamental to their core business activity of the two primary means to reduce disposal costs—(1) reducing costs per unit (i.e., ton, haul, cubic yard of capacity) or (2) reducing the number of units managed—there was fairly uniform focus on the former method with regard to the contracting process. This is consistent with many procurement activities that focus on "squeezing" the bidders on unit price. In general, once the contract is signed, organizations devote minimal resources to actively managing activities over the life of the contract.

However, there were exceptions to this rule. For example, Stop & Shop's Boston Division has a Recycling Office consisting of two full-time employees who provide logistical support to coordinate waste and recycling services and monitor service for all 110 stores under contract. Further, Stop & Shop has a target of 8-10 tons per haul and places restrictions on the timing of how stores order service (no more than 24 hours in advance) to maximize hauling efficiency and to reach this target. Similarly, One Beacon has provided incentives to several internal players and created a system to encourage diversion, thereby securing more active management through the prospect of shared gains.

A common method to restrict trash disposal costs is to use "on-call" service instead of regularly scheduled trash pick-up. Thus, organizations avoid unnecessary trash pick-ups and increase efficiency (tonnage per haul). In securing its last contract, Verizon has sought to limit its trash cost up front by drastically limiting disposal capacity at its sites and fixing costs for four pick-ups. Verizon pays for additional hauls on a variable basis. As a result, utilization of trash capacity and pick-ups has significantly improved.

Despite these incremental "first steps", very few of the participating organizations have implemented a comprehensive program to decrease disposal costs and increase diversion. Much of the focus is on hauling costs, which are, with few exceptions, relatively small—on the order of 20-30 percent of total trash costs. The organizations do not specifically target waste reduction by considering the effectiveness of recycling arrangements at the same time.

3.2.2 Recycling Arrangements

The assessment sought specific details on how compensation is provided for recycling services. In general, compensation for recycling services can be characterized as: (1) no fee for pick up or processing with some (or no) revenue paid to the customer (on a basis established by the contractor); or (2) fee for service with adjustment for independently determined market value of commodities collected. In addition, several participating organizations incurred costs for related hauling and processing services where applicable.

Acushnet, for example, falls into this first category. It established an informal agreement with a local recycling and recovery company in which it pays no fees, and receives some revenue on the material collected. However, how much revenue is given back to Acushnet appears to be somewhat discretionary on the part of the contractor. A similar arrangement exists in Texas Instrument's case with its trash/recycling contractor. In these cases, details on recyclables are

often less well documented, and partners seem satisfied to receive enough revenue to partially cover internal recycling equipment and labor expense. As a result, recycling services often garner even less attention than trash. In other cases, as with the Shattuck Hospital and Fitchburg State College mixed paper programs, no fees are paid and no revenues are provided to the customer. Thus, recycling is basically a cost neutral or "free" service.

In each of these cases, the contractors rely on covering their costs from the value of materials collected, receiving some margin of profit, and then returning additional value in some cases to the customer. This is a risky arrangement for the contractor, who in weak markets may not be able to cover its costs, or obtain only a slim profit margin. It is also risky for the recycling program itself should the contractor abandon it in a prolonged weak market.

In theory, the return provided to customers varies with the market value of particular commodities collected, but we found little transparency or specific details on how these returns are established. One exception in this category is Verizon's paper recycling contract, in which the contractor provides monthly tonnage receipts broken out by five fiber categories, and details market commodity prices and returns.

Table 5: Summary of Recycling Arrangement Type, 2000

Partner Organization	Arrangement Type (all non-scrap metal recyclables, unless otherwise indicated)*	Contract Lengths (if applicable)
Acushnet	1	
Fitchburg	1 (mixed paper only)	
General Dynamics	2	
Harvard University	2	3 yrs (6/02)
One Beacon Street	2	
Shattuck Hospital	1 (mixed paper only)	
Stop & Shop	2	3 yrs (11/02)
Texas Instruments	1	
Verizon	1 (mixed paper only)	

* (1) no fee for pick up or processing with some (or no) revenue paid to the customer (on a basis established by the contractor); (2) fee for service with adjustment for independently determined market value of commodities collected.

The remaining participating organizations (One Beacon, General Dynamics, Harvard, Stop and Shop) fell into the second category of compensation arrangement, in which participating organizations pay specified fees for services ($/ton recycled and/or hauling fees), and receive a market return that offsets some or all of these recycling costs. In strong markets, where returns might exceed costs, net revenue is generated for the customer, while in weak markets, the recycling contractor is still guaranteed its base compensation. Under this arrangement, the participating organizations are performing all the diversion activities and their recycling contractors act predominantly as haulers.

Some organizations pay for additional services associated with recycling that are broken out separately, such as shredding, collection, or specialized services. Harvard University pays an hourly paper and corrugated cardboard collection fee, while Shattuck pays a fee per minute for on-site shredding and recycling of confidential patient documents. In addition, internal personnel in all participating organizations had either collection and/or bailing responsibilities. Organizations incur costs to perform these activities that are often not documented or considered, but nonetheless contribute to the costs of providing these services.

There is generally no coordination between waste and recycling data when recycling services are obtained through separate non-waste contractor(s). In fact, the trash and recycling contractor(s) have conflicting incentives because they are competing for the same waste volume. Neither contractor has much control of the waste/recycling streams since these activities are done internally. In short, customers are performing all diversion activities internally and managing their waste and recycling contractors separately. A key component of RM is to provide a more coordinated view of waste and recycling activities and costs so that trade-offs leading to system-wide improvements and overall cost reductions (even if the cost to one contractor may increase) are not obscured.

An additional disadvantage of non-contractual "handshake" recycling arrangements is that both the customer and contractor may feel less obliged to closely manage the business relationship in the absence of a binding agreement. Formalizing agreements is the first step in encouraging more active involvement of waste and recycling contractors in meeting organizations' diversion goals.

In summary, there are several broad points that can be gleaned from our review of baseline service levels and contracting procedures from the nine case study organizations. It is likely these conclusions are applicable in a majority of Massachusetts organizations:

- Contracting is largely fragmented; waste and recycling are viewed separately with organizations typically more focused on waste.
- This lack of a systems view (inclusion of waste, recycling and overall material management) in contracts and management impedes the identification of system-wide improvements.
- Recycling is rarely included in waste contracts. It is often implemented as an add-on or free service for the generator (over one-half of the participating organizations), however it is not free for the service provider. Thus, it is typically viewed as a "cost center" and something an organization should pursue to "do the right thing".
- Most organizations do not have contracts that allow them to realize the full financial benefits of diversion. Many participating organizations have focused on logistics and made progress by unbundling the hauling aspect to some degree (going to an on-call basis) but few have completely unbundled fee structures.
- Administration of waste and recycling contracts is not a major priority.
- The two organizations that have devoted focused resources to managing contracts/ contractors have the most successful programs. The remaining seven organizations do

not see their contracts as a means to add resources to their program and increase diversion.

4. RESOURCE MANAGEMENT CONTRACTING PRACTICES IN PARTICIPATING ORGANIZATIONS

This section first discusses a suite of standard practices that can be followed by any organization to implement an RM contract or improve their existing contracts. There is no single approach to implementation of RM practices, rather each practice is flexible and will vary according to the particular organizational context. One key to success is to consider the practices systematically and apply them comprehensively to take full advantage of the synergies between the practices. The second part of the section evaluates the degree to which participating organizations are employing RM practices in their current contracts and makes recommendations on how their contracts can be improved to be consistent with RM.

4.1 How is RM Implemented?

Table 6 identifies five standard practices to prepare and implement an RM contract. Organizations that rely on disposal contracts often find that they have some elements of one or more practices in place already. Our experience shows that these practices can be applied in any organization that relies on disposal contracts to better align generator and contractor incentives to achieve resource efficiency improvements. Although the practices are interrelated, the first practice provides the foundation for implementing practices two through five.

These practices have been identified and refined as a result of this and other on-going RM projects. Three major activities that are performed through these five practices are: (a) prepare for RM by establishing a baseline of waste management/recycling levels and reviewing current contract structures; (b) provide an exclusive scope to a single RM contractor and re-evaluate customer-contractor relationships and communication patterns; and (c) establish a new basis for compensation to create incentives that reward the RM contractor for resource efficiency. The practices are essential elements of any RM contract because they align customer-supplier incentives for resource efficiency through compensation mechanisms that foster a strategic partnership. This partnership seeks continuous improvement based on supplier performance. By design, RM provides an information-rich environment in which to evaluate alternative solutions to resource challenges.

Table 6: Summary of Standard RM Practices

ACTIVITY	RM PRACTICE	DESCRIPTION
Contract Preparation	1. Establish Baseline Cost, Performance, and Service Levels	♦ Define current service scope and levels (hauling and tonnage) ♦ Identify existing contract compensation methods ♦ Validate service levels with total costs through annual baseline review/update ♦ Establish cost and performance benchmarks and goals
Transform Scope and Contractor/ Customer Relationship	2. Align all services to support resource efficiency	♦ Provide all responsibility to one contractor to coordinate, integrate, and formalize all waste and recycling contracts and services to ensure that all are mutually supportive of organizational resource efficiency goals
	3. Rethink Contractor Role and Relationship	♦ Allow or require bidders to submit operations plans for achieving specified improvements in existing operations, provide latitude in work specification ♦ Engage RM contractor in daily RM operations and responsibilities ♦ Allow or require contractor to interface with internal stakeholders (engineers, legal staff, purchasing, other contractors) to devise cost-effective solutions, assure buy-in, and foster organizational learning ♦ Establish quarterly meetings to report on performance and resolve issues
New Basis for Compensation	4. Establish Transparent Pricing for Services	♦ Delineate pricing information to specific services such as container maintenance, container rental, hauling, disposal, etc. This allows variable price savings, such as "avoided hauling and disposal" to flow back to generator and/or be used as a means for financing performance bonuses.
	5. Provide Direct Financial Incentives for Resource Efficiency	♦ Establish compensation that allows contractor to realize financial benefits for service improvements and resource efficiency innovations that result in cost savings ♦ De-couple contractor profitability from trash disposal and service levels

1. *Establish Baseline Cost, Performance, and Service Levels.* The waste generator interested in RM should identify the full scope of waste management services for which it currently contracts, including container/compactor rental, hauling, disposal, recycling and/or other composting/diversion service. At a minimum, the most recent year's service levels, including hauling and tonnage data for trash and recycling (by material if possible), should be detailed.[12] This facilitates assessment of potential diversion and resource efficiency (e.g., recycling, composting, source reduction) opportunities, and hence short to mid-term RM potential. Waste stream profiles specific to the organization are also helpful in this process. In lieu of this data, industry standard data can be used to estimate the composition of generated waste streams (see Appendix D).

   All costs for waste handling, consolidation, processing, and other associated activities should be documented. Organizations that rely on disposal contracts are usually aware of the

[12] Several years of data provide a more complete picture and an idea of variability and trends.

disposal costs paid to external waste management companies, but often do not account for all the internal and hidden costs associated with managing discards.[13]

The completed baseline allows the organization to see a more complete overall picture of the waste management program and validate services levels through annual baseline reviews. The baseline information highlights the possible value of RM by identifying opportunities for waste reduction and process efficiencies. This information also helps justify the business case for RM to upper management. More detailed and transparent information will also assist in bid evaluation by disaggregating costs and service levels to determining the value "cap" on what the organization expects or is willing to pay for services. Lastly, this activity serves as a point of departure from which an organization assesses its waste management/diversion goals and benchmarks its performance against others. This practice serves as the foundation upon which all other practices are built, and should therefore be completed prior to soliciting RM services.

2. *Align all Services to Support Resource Efficiency.* Organizations often have in place multiple, uncoordinated waste contract and recycling agreements. This can be attributed to a lack of management attention due to the low cost profile and business significance of waste contracting, as well as an *ad hoc* approach to contracting, which looks at waste and recycling separately. In our experience, a lack of harmonization impedes progress in resource efficiency and precludes a unified management scheme based on a systematic view. This practice advocates endowing a single contractor with all responsibility for waste, recycling and related internal activities.

   Lack of interconnection between waste hauling/disposal contracts and recycling/diversion programs often translates to contractors competing over management of a customer's waste stream. This is exacerbated by the informal nature of many recycling programs, which are often provided as "free" services. Often, multiple contractors are responsible for their own limited portion of the total waste or recycling picture, impeding a systems approach in which coordinated price signals for trash, recycling, and other services offered under an RM program are mutually reinforcing in support of resource efficiency goals. The RM contractor is compensated as a "gatekeeper" to assure these services are thus aligned even though some services may be sub-contracted out to other specialized contractors.

3. *Rethink Contractor Roles and Relationships.* One of the cornerstones of a successful RM program is a changed nature of the customer-contractor relationship. Both in the bid phase, and once a contract has been awarded, the customer stands to gain from seeking strategic input and a more active role from the contractor. The idea is to tap into contractor expertise and core competency in waste recycling and other diversion activities

   Jointly defining RM scope and incentives in the bidding phase lays the groundwork for a more collaborative alliance once the contract is in place. Once all practices are implemented,

[13] For example, in related work with chemical supply services, Tellus found that companies spend between $1 and $6 managing chemicals for every $1 spent on purchasing chemicals. Internal costs may include the management of all contractors' labor for internal handling and source separation of materials, processing, and any regulatory costs associated with waste and recyclables.

the RM contractor has the incentive to work more closely with the customer to achieve cost saving (and hence profitable) improvements in resource efficiency. Consequently, for this business model to be viable, the RM contractor must be given access to key stakeholders that affect waste generation, such as line employees, engineers, environmental managers, purchasing managers, and suppliers. One result of this new strategic relationship is improved and more frequent contractor-customer communication. We recommend regular meetings to report performance and new resource efficiency initiatives.

4. *Establish Transparent Pricing for Services.* A transparent pricing structure is a prerequisite to finance RM incentives or performance bonuses. Contracts should break out all individual waste and recycling charges, and provide compensation for only those services received. Individual charges include separate hauling, disposal, processing, market revenues, and any equipment rental. Paying individual fees for service allows for savings from increased diversion to be realized.

   Clearly delineating specific pricing for each service element places the organization in a position to implement practices 5 and 6. Providing financial incentives for value-added services differentiates RM from mere "leveraged" purchasing that focuses on one-time unit cost reductions. Transparent and variable pricing structures also demand billing practices that itemize service levels which further support documentation of performance (practice 1).

5. *Provide Direct Financial Incentives for Resource Efficiency.* Providing the right incentives for suppliers to pursue resource efficiency opportunities is the linchpin in RM contracting. These incentives, in the form of bonuses for exceeding specific performance targets, are provided from cost savings produced by improvements proposed and implemented by the contractor. For example, the customer may pay a performance bonus for each ton of material recycled over a specified target. Alternatively, "gain-sharing" arrangements can be created such that the customer and RM contractor share the savings from resource efficiency improvements.

   This practice encourages the RM contractor to assume a more active role in working with the customer to continuously improve resource efficiency. The designation of accurate and equitable performance bonuses relies on comprehensive baseline information and transparent pricing structures (practices 1 and 4). For this new form of compensation to be acceptable to the customer, arrangements must be cost competitive with current costs of the waste and recycling program. For the contractor, it must provide a reasonable profit margin, risk level, and opportunity for growth.

   Incentives are commonly financed with savings on disposal fees, hauling costs, and increased recycling revenues. Other cost savings that can be used for incentives include reduced storage requirements resulting from more effective ordering, volume price discounts, and more economical material use. As the RM contractor moves further "upstream" the value of these savings and the profitability for both the RM contractor and customer under a gain-sharing arrangement can be quite large. The underlying objective is to divorce the contractor's profit incentive from providing increasing trash service.

4.2 Recommendations to Enhance Contracts Through Use of RM Practices

This section provides a summary of our assessment of the extent to which the RM practices defined above are currently being employed by case study organizations. It describes overall trends, points out cases in which the application of practices was either particularly successful or deficient, and discusses means by which partners can implement or improve upon their execution of each practice.

While many organizations have successfully implemented one or two RM practices, only one (One Beacon) has approached complete implementation of all RM practices (Table 7). Not coincidentally, One Beacon has achieved the second highest diversion rate of the nine organizations participating in this study. One important element of One Beacon's program is that the incentives do not go to an external waste or recycling contractor. Rather, the property management firm, CB Richard Ellis Partners (CBRE), oversees all waste and recycling contracts. In this case, CBRE has designed the waste and recycling contracts so that savings from diversion are realized. CBRE then uses those savings to provide incentives to internal stakeholders (e.g., One Beacon employees and the janitorial contractor,) and contract extension potential to waste/recycling contractor in return for cost savings.[14] In short, CBRE is acting as the RM contractor but is not taking a portion of the cost savings itself.

Others who have implemented one or two practices may realize some improvements, but are far from achieving the full potential of RM. As stated previously, RM is not a "one-size-fits-all" model. Thus, our observations from the nine case study organizations below attempt to generalize trends that are likely indicative of other Massachusetts organizations. Specific recommendations for each partner organization can be found in the case studies in Appendix A.

[14] Direct incentives are not, however, provided to the waste hauler.